

*Cassels (J. L.)*

AN

# INTRODUCTORY LECTURE,

DELIVERED BEFORE THE

MEDICAL DEPARTMENT

OF THE

# WESTERN RESERVE COLLEGE,

IN CLEVELAND.

*box 3-*

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**BY J. LANG CASSELS, M. D.,**

PROF. OF MATERIA MEDICA AND BOTANY.  
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# NOTES

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At a meeting of the Students held in the Medical College, Nov. 11th, 1846, W. B. McCANN was appointed President, and DAVID A. HOFFMAN, Secretary.

On motion, a committee was appointed, consisting of Thomas Graham, Cincinnati; B. D. Blackstone, Athens; Wm. Gutch, U. Canada; Wm. G. Hatch, Wisconsin; R. K. Long, Indiana; Wm. P. Lattimore, Pa.; R. H. McCall, Canton; Daniel Cameron, N. Y.; Jacob H. Camburn, Michigan; and C. L. White, Terre Haute, O., to wait upon Prof. Cassels and request a copy of his Introductory Lecture for publication.

W. B. McCANN, Pres't.

DAVID A. HOFFMAN, Sec'y.

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#### CORRESPONDENCE.

*Prof. Cassels*—SIR: The Medical Class, through us, their Committee, would respectfully solicit from you a copy of your highly interesting Introductory address, for publication.

Yours, &c.

THOMAS GRAHAM, B. D. BLACKSTONE, WILLIAM GUTCH, WILLIAM G. HATCH, R. K. LONG, W. P. LATTIMORE, R. H. McCALL, DANIEL CAMERON, JACOB H. CAMBURN, C. L. WHITE,	}	Committee.
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J. LANG CASSELS, M. D.,

Prof. Materia Medica, Pharmacy, and Botany.

Nov. 12, 1846.

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CLEVELAND MEDICAL COLLEGE, Nov. 14, 1846.

GENTLEMEN,—In compliance with your request, as the Committee of the Medical Class, I place at your disposal the manuscript of my Introductory Lecture, with my sincere acknowledgements for the favor with which it has been received by the Class.

Very respectfully, Yours, &c.

J. LANG CASSELS.

To Messrs. Graham, Blackstone, and others.



The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is well-posed and that the solution exists and is unique. The second part of the paper is devoted to the construction of the solution. It is shown that the solution can be constructed by the method of successive approximations. The third part of the paper is devoted to the numerical solution of the problem. It is shown that the numerical solution can be obtained by the method of finite differences.

Table 1

	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The numerical solution of the problem is obtained by the method of finite differences. It is shown that the numerical solution can be obtained by the method of finite differences. The fourth part of the paper is devoted to the conclusion. It is shown that the problem is well-posed and that the solution exists and is unique.

## LECTURE OF PROF. CASSELS.

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As an introduction to my course of Lectures on Botany, I wish to direct your attention to a few thoughts, hastily thrown together, on the importance and value of a general knowledge of this subject, and some of the pleasures derived from its cultivation.

When it is recollected that the whole animal creation derive their sustenance, either directly or indirectly, from the vegetable kingdom, it is matter of surprise that botany should be regarded with so much indifference by the great mass of mankind. In no department of Nature has man so direct an interest as in that of botany; yet we find that this subject is less generally understood, than almost any other, within the grasp of the human intellect. And it is no less surprising than true, that even intelligent physicians, men whose principal business rests on the correct observation of Nature's varied laws, should be so generally ignorant of the source of four-fifths of their most valued remedial agents; the inexhaustible storehouse, from which may be still selected a much larger, and perhaps a more valuable set of remedies, than those they now employ—antidotes for all the ills of life. But how does our surprise expand into wonder, when we are informed that even those who dignify themselves with the title of *Botanic* physicians, are as ignorant of even the alphabet of botanical science, as the red man of our forest is of those of the Hebrew language.

I am well aware that the student of almost every branch of human knowledge, while ardently engaged in his favorite pursuit, perceives advantages, and feels pleasures, growing out of the investigation, to which others are wholly insensible; and he is very apt to wonder why others are so blind to what he imagines to be for their direct interest, and the source of some of the purest of all rational enjoyments. This may be the character of our surprise at the great neglect, not to say the almost contempt, with which we suppose this branch of natural science is treated, and by those too whom we suppose the most directly interested in the investigation. I mean those whose business



in life, and those whose professional duties, require such knowledge. But aside from these, the numerous pleasures arising from the investigation of this department of Nature, might, in my estimation, secure to it the attention of every philosophic mind and every truly good heart. Whose bosom does not swell, with the tumultuous joy which pervades all animated nature, on beholding the first flowers which usher in the dawn of spring, with all its rejuvenating effects? Who is not delighted with the rural landscape and the flowery lawn? I would not envy the possessor of the heart who can look upon Nature, when clothed in all her midsummer glory, with stoic indifference; such a heart must be well fitted "for stratagem and crime."

If the sight alone, that which "the grosser sense perceives," is capable of exciting into their fullest action these, the loftiest feelings of our nature, what must be the character of those sensations experienced while exploring the structure and physiology of plants, with the application of those principles, for the benefit of our race, either as food or as restorative agents? Every truly honest heart is always delighted in doing good, and who can do more good than he who, by his knowledge, is capable of adding to the comfort of his species, or averting from them the stroke of disease?

I imagine, few persons who have ever plucked, even the lowliest flower that decks the common field, and had their mind directed to its curious arrangement, the elegance and utility of its several parts, and its adaptation to the wants of animated existence, will unqualifiedly repudiate the study of botany. And fewer still, after they have passed the portals, within which lie expanded the untold beauties of the vegetable creation, and had unfolded to their astonished view its grandeur, beauty, and perfect symmetry. For, as they ramble among the secret workings of this, Nature's favorite department, the whole energies of their soul become deeper enlisted, and soon their ardor is fanned into a blaze of enthusiasm. As soon as they become familiar with the structural arrangement and physiology of plants, and find that each is essentially contributing to its own existence and the continuation of its species; when they observe the variety of modes and contrivances by which they are affected, they feel that here they can give full scope to their admiration, and find employment for the noblest faculties of their being. Such is botany, and such are some of the pleasures arising from its study. Who would not be a botanist?



Who, through indolence, or any other means, would sacrifice so much human enjoyment?

No man, in his sober senses, can, for a moment, suppose that the laws and arrangements of Nature are unworthy his observation, and even minute examination. Who has the temerity to maintain that Nature's works, productions bearing in every feature the impress of wisdom and design, are too trifling to engage the attention of created beings? Or who so madly blind to the origin of all that he holds dear on earth, as to imagine that the works of art, the comforts of life, and all human enjoyments, do not flow from that source? What are all the works of art, the infinite contrivances of man, in all their diversified aspects, but the modified application of Nature's laws with her own implements? Is there a principle in mechanics, an element in artizan operations, or a general truth in science, that has not an equivalent in Nature? This is the very fountain whence issues all the numberless streams of man's pleasures and comforts, modified to suit his varied wants. And is he so ungrateful as to deny this debt?

If this is true in respect to the pages of the great book of Nature generally, it is no less applicable to that chapter which treats of vegetation. In fact, there is not a single paragraph in this extensive volume, in which man has so direct an interest, nor one that has stronger claims on his attention. Is this not the garner of his food, the deposite of his medicines, and the storehouse of his luxuries? Is it not the source of the greatest and purest of his rational enjoyments? To this we are indebted for our shady lawns and luxuriant fields. From scientific botany must originate all improvements in gardening and agriculture, the most useful and pleasing of all human pursuits. In all countries, civilization and agricultural improvement have ever gone hand in hand; and it is only when scientific botany shall be properly understood and duly appreciated, that any essential improvements in gardening, horticulture, and agriculture, may be reasonably expected. When botanical principles shall be known, and philosophically applied, we may expect to see, in our own highly favored land, farms yielding, with a mathematical certainty, their annual products, free from those fluctuations which at present so often blast the husbandman's expectations. When the agriculturist shall guide his operations by these principles, and become acquainted with the habits, constitution, and physiology of those plants he cultivates, and know



the food best adapted to their organization, this, the most useful of all arts, will take its place among the physical sciences. Then, too, may he previously calculate the quality and value of his crops, with a degree of certainty bordering on the absolute. Moreover, he will then comprehend the nature of the morbid actions, and apply remedies with success to those diseases which attack his crops, that now baffle all his skill. Agriculture, and its collateral branches, will then be one of the most rational and philosophic employments of man, and capable of affording him the highest grade of enjoyment, stript of all that irksomeness and uncertainty which at present attend many of its operations.

Although few, in these days of general information, seriously question the utility of botanical knowledge in the cultivation of plants, yet little is done, except a reluctant acknowledgement of the fact, towards the general diffusion of this knowledge among those whose lives are devoted to the cultivation of the soil. It is a melancholy fact, that our farmers, the noblemen of our country, are generally destitute of this, to them indispensable information. Here is an educational error which demands immediate correction.

But the advantages of botanical knowledge to agriculture and its sister arts, are not a tithe of its value to mankind. A knowledge of botany exerts a great influence over man's moral character. The contemplation of the varied beauty of flowers and plants, begets in us a love of peace and harmony ; and while holding conference with them in our morning walks and noonday rambles, our feelings become softened and elevated beyond the avaricious scramble for power and dominion. Who ever heard of a vicious, dissolute, or immoral man, being devoted to the cultivation and arrangement of plants ? It is universally admitted, that the cultivation of flowers is a neutralizer of all the harsher feelings of our nature. How often, as we pass the rude hut, over which is carefully trained the twining honeysuckle, and the flower clustered eglantine, do we exclaim, that peace and harmony dwell there ; even amid the stronger marks of poverty and misfortune. Flowers and shrubs, tastefully arranged around a dwelling, are strong evidence that cheerfulness, comfort, and refinement have an abiding place within.

The cultivation of flowers also tends to strengthen our piety and



patriotism. Those who rear, with a tender solicitude, the plants and shrubs of their own, or other countries, around their homes, feel their attachment to the spot, keeping pace with their growth ; and while they contemplate these, the works of their Maker, they become animated with a glowing spirit of devotion ; and their autumnal decay reminds them of their own brief existence, filling their hearts with subdued reverence and humiliation. Galileo, when interrogated by the Inquisition as to his belief in a supreme Being, replied, pointing to a straw on the floor of his dungeon, "that, from the structure of that object alone, he would infer the existence of an intelligent Creator." Every part of the vegetable kingdom, when examined with a true spirit of inquiry, points the mind to the consummate wisdom and skill displayed in its structural organization and mechanical arrangement. In this respect the grasses, the most common and useful of all plants, exhibit this principle in an eminent degree. They, as you know, are tall, slender, hollow tubes, supporting at their summit a deposit of seed of considerable weight and bulk. Now, it is susceptible of mathematical demonstration, that of every possible mode of disposing a given quantity of matter in the construction of a column, this is the most effective to obtain the greatest strength with lightness, two properties highly essential to this class of plants, and which could not have been obtained had the same amount of matter been disposed in any other form. The stability of plants, from the disposition of their roots in the soil ; the disposition of their leaves, in bringing a great extent of surface to the action of light and air ; and even the very elasticity of their limbs, in aiding the circulation of the sap, point, with an unerring finger, to the fact, that "in wisdom He hath made them all."

In short, the farther our philosophic scrutinies are carried into this highly interesting part of creation, the more readily will our hearts respond to the divine exclamation of Him, who spake as never man spake, that "even Solomon, in all his glory, was not arrayed like one of these !"

A microscopic examination of this, Nature's favorite domain, exhibits her operations in a manner equally grand and systematic, although on a scale inconceivably minute. This is one of her fields into which few enter, but those who do are amply compensated for their research. This instrument unfolds, not only the secret opera-



tions of vegetable life, and the adaptation of the different organs to their varied offices, but it also reveals the startling truth, that no part of vegetation, however limited, is unoccupied by animated existence. Every leaflet and flower, every spire of grass and shred of moss, afford a home and food to myriads of animals, sporting in all the pleasures and luxuries of which their organization is susceptible. Some of the most pleasing and delightful pictures in Nature, are thus exhibited, in this appendix to the visible creation. Here the student of Nature finds a rich reward for all his toil, delights reserved by Nature for her favored few. But I cannot give you a better outline of those feelings, experienced during the examination of such objects, than in the language of one of Nature's close observers. While speaking of the diversified beauties and points of attraction exhibited in the Carnation, he says, "its fragrance induced me to enjoy it frequently and near; the sense of smell was not the only one affected on these occasions. While that was satisfied with the powerful scent, the ear was constantly attacked by an extremely soft, but agreeable murmuring sound. It was easy to know that some animal, within the covert, must be the musician; and the little noise must come from some little creature suited to produce it. I instantly distended the lower part of the flower, and with my glass could discover troops of insects, frisking with wild jolity among the narrow pedestals that supported the petals. What a fragrant world for their habitation! What a perfect security from all annoyance in this scene of action! I contemplated this scene for several days, and discovered their economy, their passions, and their enjoyments. The microscope had given, on this occasion, what Nature seemed to conceal. The base of the flower extended to a vast plane; the slender stems of the petals were like so many stately cedars; the filaments seemed columns of massy structure, supporting at the top their several ornaments; and the narrow spaces between were enlarged into walks, parterres, and terraces. On the polished bottoms of these, brighter than parian marble, walked in pairs, alone, or in larger companies, the winged inhabitants; glorious, glittering animals, stained with living purple, and with glossy gold, that would have made all the labors of the loom contemptible in the comparison. I could at leisure, as they walked together, admire their elegant limbs, their velvet shoulders, and their silken wings; their backs, vieing with the empyrean in its blue; and



their eyes, each formed of a thousand others, outglittering the little planes on a brilliant, above description, and too great almost for admiration. I observed them singling out their mates, and entertaining them with buzz and song, and leading them from walk to walk among the perfumed shades. Here were the perfumed groves, the more than myrtle shades of the poet's fancy. Here, in the triumph of their little hearts, they skipped from stem to stem, among the painted trees, or winged their short flights to the close shadow of some broader leaf."

After perusing this description, will any one question the pleasure this naturalist experienced during his observations? He says he contemplated this scene for many days together.

The study of Botany may be advantageously employed as a means of mental improvement. One of the principal objects of juvenile mental training is, to give it strength of action and habituate it to a concentration of all its energies on a single object, at the will of the student. Although the study of mathematics stands pre-eminent for the accomplishment of these objects, yet, from the irksomeness of this study to ~~man~~, botany may be employed, at least in these cases, as a substitute. To all, botany has peculiar attractions when properly inculcated. To many, mathematics is dry, unmeaning and tiresome. The endless variety of color and form of plants, keeps the mind active, and does not allow it to become fatigued or cloyed. Botanical investigations also serve to produce an accuracy in discrimination and comparison, the foundation of correct taste and sound judgment.

A knowledge of botany ought to be regarded as an essential element in every accomplished physician's education. Although the *Materia Medica* of the modern practitioner contains many exceedingly valuable and indispensable articles of *mineral* origin, yet a much larger, and no less valuable proportion of his remedial agents, are of vegetable derivation. And no physician's knowledge, of even the preliminaries of medicine, can be complete, unless he is familiar with the derivation, composition, habits, mode of preparation and action on the animal economy, of the articles of his *Materia Medica*, both in their prepared and natural states. It would certainly be preposterous to imagine that any man possesses this information, which we deem not only advantageous, but absolutely necessary, if he is ignorant of botanical science. Yet, how many of our best educated



physicians are botanists? I do not mean to say that a man cannot be a skillful and successful practitioner of medicine, who is not a botanist; but I am ready to express my conviction, that such knowledge would be a valuable addition to his other medical acquirements. One thing is beyond controversy, that a physician, who knows little of botany, must be content to plod through the path beat by his predecessors, and fight disease with the weapons tried and put in his hands by others, without adding one new remedy from the vegetable kingdom to the list of curative agents. Such a man can never become acquainted with the medicinal powers of the plants of his vicinity, and must consequently be always harassed and annoyed by every herb gatherer and prescriber in his neighborhood. He is also destitute of the surest weapon to kill Thompsonianism. It is true, that the medical virtues of many valuable plants have been discovered by accident, and such may again occur; but it is not to these that we ought to look, with any degree of confidence, for additions in medicine. Such discoveries are always uncertain, and often dangerous. But the botanist is acquainted with certain determinate principles, from which he can infer the properties of plants with such certainty, that he subjects his patient to little risk in testing their true medicinal character. And he need not be afraid that this subject is exhausted; perhaps the healing powers, of a ten thousandth part of the vegetable world, has not been satisfactorily tested, neither is there any proof that the most efficacious have been selected.

Perhaps on no subject is public sentiment more frequently wrong, and requires a corresponding correction, than that of medicine. There is at present a strong popular feeling in favor of vegetable medicines, and an equally prevalent opinion that our regular practitioners are ignorant of the nature and powers of botanic medicines. It is also generally believed that we use little else than *mineral* medicines in our practice. This opinion, stoutly promulgated by designing men, is totally untrue, and ought to be corrected. But so long as we take no pains to inform the people that *nine-tenths* of our remedial agents are obtained from the *vegetable* kingdom, so long will this thirst for botanic medicines remain unsatiated, and so long will they employ those who are willing to grant their requests. I am strongly of the opinion that, were the relative proportions of vegetable and ~~animal~~ medicines, which the regular profession employ, more gene-



rally known, we would hear less clamor about *botanic* medicines. And I am confident that the popularity of the "Botanic Doctor," and the matchless skill of the "Indian Root Doctor," would then tumble to their proper level. Then, too, would community *properly* appreciate the *true* worth of those "vegetable panaceas," "sanatives," and cure-alls, with which the country is at present so much flooded.

Another popular error deserves a passing glance. A large proportion of the "exclusive vegetable" loving community, are strong in the belief that all those who style themselves "Botanic physicians," are thoroughly skilled in everything touching medical botany, both foreign and domestic. Now, I will venture to affirm, that not one Thompsonian in a hundred knows anything about even the alphabet of botany, descriptive or structural. But I am not aware that their system of practice requires any such knowledge, although their patrons usually award it to them. If their system require such knowledge, it is gross injustice, as it is more than its originators possessed. The whole of the botanical knowledge of a large proportion of the disciples of Samuel Thompson, consists of following in the footsteps of their illustrious prototype, in having a huge pair of portmanteaus stuffed with dried plants, a sanctimonious countenance, and an inveterate repugnance to calomel.

Several years ago, I called at the office of this reformer of medical science, for the purpose of gleaning some information respecting the botany of his neighborhood; but, although I found him in the midst of half dried plants, and bottles of vegetable tinctures filling every nook and corner of the building, I could obtain no information respecting botany. He descanted freely on the great efficacy of many of his specimens, which I *knew* possessed no more power on the animal economy than a decoction of oat-straw. Of the principles of botanical science, I became satisfied, he was grossly ignorant. Such was the founder of the Botanic system, and such I apprehend are too many of his followers. Yet such is the credulity of mankind, that many are almost willing to award to them the power of miracles. Here is a popular error, which requires correction; and, in my opinion, no surer method can be devised, to strip these boasters of their cloak of pretention, and expose to public gaze their moral obliquity and ignorance, than a thorough knowledge of botany in our own profession.



From all this, I do not mean to be understood, that the "Botanic physician" does never effect cures of disease ; the wonder with me has been, why they did not effect more cures. But, in place of having fixed principles to guide them in their prescriptions, and the power of modifying these principles to particular cases, they indiscriminately apply their remedies to all diseases, and under all circumstances.

Still, another grave error in public sentiment, which calls equally loud for correction. I mean the opinion so prevalent in this country, that the Indians know more about the medical virtues of plants than the whites. Hence arises the general impression, that if an individual has lived among the Indians, or been acquainted with some one who has, he is well qualified to perform miraculous cures of disease. It is as difficult to trace out the origin of this notion, as it is to persuade many of its fallacy. But it is well known to every one who is at all acquainted with the character and habits of the Indians, in their own country, that they place more confidence, in cases of serious sickness, in ceremonies and incantations, than on medicines. It is also well known that, although they are very fond of medicines, if only slightly indisposed, even then they will seldom touch that of their own collecting, if they can possibly obtain that of the white.

From personal observation, I am well satisfied that the Indians know little of the medical powers of plants, and far less of principles to guide them in their exhibition. During the past season, while coasting Lake Superior, one of our canoe crew became unwell, and insisted that I should give him some medicine ; but supposing that laziness had more to do in the case than sickness, I refused to give him any. We soon after arrived at an Indian encampment, where was a squaw, held in high repute for her medical skill among her tribe. To her he applied for relief. She put an armful of plants and bushes, which she collected in the woods for the occasion, into a large camp-kettle, with water ; and after boiling for about an hour, and being sufficiently cooled, she administered this decoction to her patient in liberal doses. The whole of this operation I observed with a good degree of interest and attention. By the skill of the squaw, and the efficacy of her medicines, he so far recovered as to return to his duty the next day ; not, however, until he was satisfied that he would be dismissed from our employ if he did not get better. I ex-



amined these plants, and found the dose to consist of fifteen different species, with which I was familiar, none of them possessing any medicinal powers whatever, except some *sweet-fern* and *hemlock boughs*. This may be considered a fair sample of Indian practice. More of a similar character, attended by the same success, frequently came under my cognizance. Many plants were also shown me, which were considered specifics for diseases, which, from their sensible properties, could not produce the effects ascribed to them.

Such, then, is the character of the healing art among the Indians, in their own country ; and from personal knowledge, I am satisfied it is a fair representation of it among those whites who style themselves Indian doctors among ourselves. And yet men of intelligence and discretion, in other matters, are willing to entrust their own lives, and those of their dearest friends, during sickness, in the hands of these "Indian Root Doctors," A sad monument of the progressive intelligence of the age !

In conclusion, I ask, is the subject of Botany unworthy our attention, as lovers and observers of Nature ? Is it beneath our notice as physicians ? Is there a subject in Nature that has stronger claims upon us as rational and intelligent beings ? Can the investigation of any subject afford us more delight and innocent enjoyment ? Or is the practical value, derived from the research, not sufficient compensation for the time employed in its acquisition ? Again, I ask, is a knowledge of botany not a valuable appendix to a medical education ? If a response of acquiescence is given to these interrogatories, with a firm resolve to acquire them, I can assure you, you will never look back to the starting point with regret.

Every one who will deign to pass even a wandering thought on this subject, must conclude that it is capable of affording many of the most pleasing and interesting enjoyments of which our nature is susceptible. The united testimony of all botanists tend to this conclusion.

Botany is within the reach of every intellect. The plea of hard and barren technicalities, so often urged against it, is a flimsy excuse, that hangs only on the lips of the indolent ; the willing and engaged mind soon surmounts, and even loves, these apparent obstacles, because

he finds them the language of the science, without which, as such, it could not exist.

Finally, I urge all who love flowers, all who can admire Nature in her fairest robes, all who relish delicious fruits, all who desire fertile fields, all who would practice the healing art with pleasure and success, and all who would aid in the downfall of botanic quackery in medicine, to devote a portion of their time to scientific botany.